

**CLAIMS**

What is claimed is:

- 1           1.       A data storage device, comprising:  
2           a closed interior space containing a noble gas;  
3           a plurality of electron emitters having emission surfaces exposed within the  
4 interior space, the electron emitters adapted to emit electron beams; and  
5           a storage medium contained within the interior space in proximity to the  
6 electron emitters, the storage medium having a plurality of storage areas that are  
7 capable of at least two distinct states that represent data, the state of the storage areas  
8 being changeable in response to bombardment by electron beams emitted by the  
9 electron emitters.
- 1           2.       The device of claim 1, wherein the noble gas is neon gas.
- 1           3.       The device of claim 1, wherein the interior space is maintained in a  
2 vacuum.
- 1           4.       The device of claim 3, wherein the vacuum is less than approximately  
2  $10^{-6}$  Torr.
- 1           5.       The device of claim 4, wherein the vacuum is greater than  
2 approximately  $10^{-3}$  Torr.

1           6.       The device of claim 1, wherein the electron emitter comprises a field  
2 emitter.

1           7.       The device of claim 1, wherein the electron emitter comprises a flat  
2 emitter.

1           8.       A data storage device, comprising:  
2           a closed interior space;  
3           a plurality of electron emitters having emission surfaces exposed within the  
4 interior space, the electron emitters adapted to emit electron beams;  
5           a storage medium contained within the interior space in proximity to the  
6 electron emitters, the storage medium having a plurality of storage areas that are  
7 capable of at least two distinct states that represent data, the state of the storage areas  
8 being changeable in response to bombardment by electron beams emitted by the  
9 electron emitters; and  
10          means for removing contaminants from the emission surface of the electron  
11 emitter.

1           9.       The device of claim 8, wherein the means for removing contaminants  
2 from the emission surface comprise noble gas provided within the interior space.

1           10.     The device of claim 9, wherein the noble gas is neon gas.

1           11.     The device of claim 8, wherein the interior space is maintained in a  
2 vacuum.

1           12.     The device of claim 11, wherein the vacuum is less than approximately  
2  $10^{-6}$  Torr.

1           13.     The device of claim 11, wherein the vacuum is greater than  
2 approximately  $10^{-3}$  Torr.

1           14.     The device of claim 8, wherein the electron emitter comprises a field  
2 emitter.

1           15.     The device of claim 8, wherein the electron emitter comprises a flat  
2 emitter.

1           16.     A method for storing data, comprising the steps of:  
2 forming a data storage device including an interior space;  
3 providing a noble gas within the interior space; and  
4 sealing the interior space such that the space is maintained in a vacuum.

1           17.     The method of claim 16, wherein the noble gas comprises neon gas.

1           18.     The method of claim 16, wherein the data storage device includes an  
2     electron emitter adapted to emit electron beams and a storage area that is capable of at  
3     least two distinct states that represent data.

1           19.     A method for removing contaminants from an emission surface of an  
2     electron emitter of a data storage device, comprising the steps of:  
3             providing a noble gas within an interior space of the data storage device to  
4     which the emission surface is exposed;  
5             exciting atoms within the gas by impacting them with an electron beam  
6     emitted by the electron emitter;  
7             wherein the atoms of the gas are ionized by impact with the electron beam and  
8     accelerated toward the emission surface to sputter remove the contaminants from the  
9     emission surface.

1           20.     The method of claim 19, wherein the noble gas is neon gas.